

EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS  
ON THE FRANCIS MARION AND SUMTER NATIONAL  
FORESTS, SOUTH CAROLINA

By

J. H. Thompson, W. E. McDowell,  
and R. E. Brooks

INTRODUCTION

Biological evaluations of southern pine beetle were done on all districts of the Francis Marion and Sumter National Forests during August 1975 (Figure 1). The evaluations consisted of aerial sketchmap surveys followed by ground checks of selected representative beetle spots. The purpose of the evaluations was to determine the current status of the infestations, estimate their trend, and appraise the need for continued suppression efforts.

The beetle infestations on these national forests are part of a South-wide outbreak. Infestations occurred on all seven districts in 1974.

METHODS

Standard aerial sketchmap and ground techniques were used during the survey.<sup>1/</sup> The aerial sketchmap survey was 50 percent on the Andrew Pickens, Edgefield, Enoree, Long Cane, and Tyger Districts of the Sumter National Forest and 25 percent on the Wambaw and Witherbee Districts of the Francis Marion National Forest. A total of 25 beetle spots were checked on the ground to confirm the causal agent and to determine the general condition of the beetle populations.

TECHNICAL INFORMATION

Insect - Southern pine beetle, *Dendroctonus frontalis* Zimm.

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<sup>1/</sup> Detection of Forest Pests in the Southeast. 1970. USDA, USFS, SA, S&PF, Div. of FPM, Pub. S&PF-7, Atlanta, Ga. 51 pp.

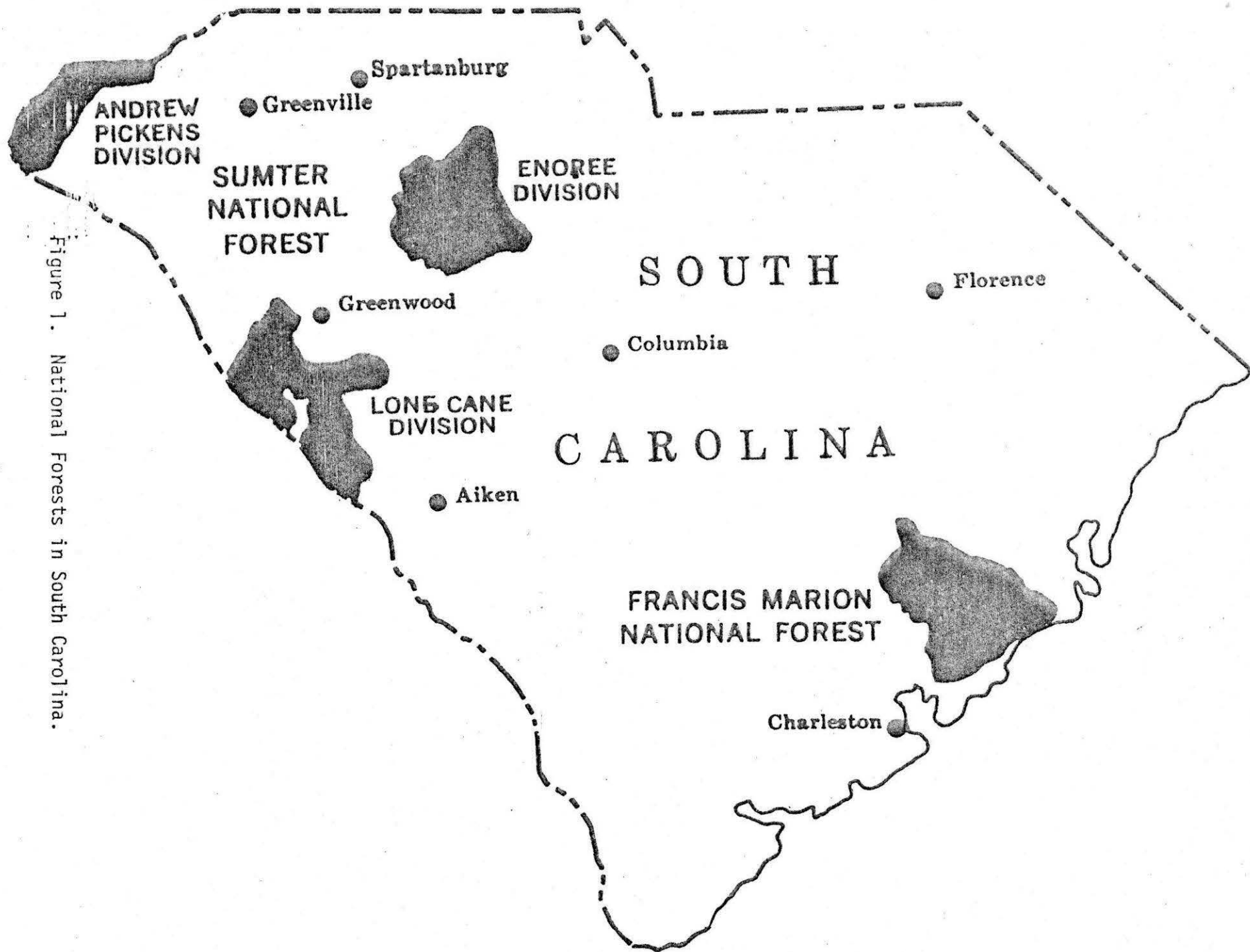


Figure 1. National Forests in South Carolina.

Hosts - Southern pine beetle is a native forest pest that will attack all species of southern yellow pine. However, loblolly pine, *Pinus taeda* L., and shortleaf pine, *P. echinata* Mill., are the preferred hosts.

Type of Damage - Death of the tree is the result of mining in the cambium by the southern pine beetle as it constructs egg galleries. The beetle also introduces blue stain fungi, *Ceratocystis* spp., which slow down or block conduction of water in the stem. The size of an infestation may range from a single tree to several thousand trees.

Life Cycle of the Beetle - Southern pine beetles attack in pairs and construct a winding gallery in the cambium. Eggs are deposited in niches along the sides of the galleries. The eggs hatch into whitish grubs that further mine the cambium and then construct cells in the bark where they pupate and change to adults. The new adults then mine through the bark to emerge. The complete life cycle takes about a month during the summer, and as many as four or five generations may be produced annually in the area.

## RESULTS

Results of the evaluations are summarized in Tables 1 and 2. The surveys indicate that the severity of infestations vary considerably between districts. The beetle population on the Long Cane District is down sharply from the previous year. The number of spots have increased on the Enoree District but they are mostly small with a resultant low number of infested trees. Populations remain high on the Andrew Pickens, Tyger, and Edgefield Districts. The problem is most acute on the Edgefield District where very large spots account for a high number of infested trees (over 18,000).

Beetle spots are numerous but small and scattered on the Wambaw and Witherbee Districts of the Francis Marion National Forest. There has been a sharp decline from the previous year in total number of infested trees.

## DISCUSSION AND RECOMMENDATIONS

The decline in southern pine beetle populations on the Francis Marion National Forest conforms to a general reduction of infestation levels on the Atlantic Coastal Plain this year. The survey data indicate that, to the extent possible, suppression efforts on national forests in South Carolina should be concentrated on the Edgefield, Tyger, and Andrew Pickens Districts.

Suppression measures presented in the 5250 section of the Forest Service Manual are as follows:

1. Removal of Infested Trees by Commercial Sale or Administrative Use. When infested trees of merchantable size are accessible, they should be removed by commercial sale or administrative use procedures. Logging of the infested material should begin immediately. Contract time limits should insure rapid removal.

Where practical, and if host type is present, a 40- to 70-foot buffer strip should be marked and cut adjacent to and ahead of the most recently infested trees. This practice is effective in reducing the possibility of "breakouts". When only a small volume of infested merchantable material occurs in a spot, non-infested trees surrounding the spot may be marked to provide an operable cut.

The order of priority for removing beetle infested timber from a spot should be as follows:

Trees having nearly developed broods (usually the red and fading trees).

Trees having young broods (usually the green, recently infested trees).

Trees in the buffer zone.

2. Piling and Burning. Unmerchantable or inaccessible southern pine beetle infestations can be suppressed by cutting, piling, and thoroughly burning the bark of infested trees. The entire bark surface must be thoroughly burned to insure effective control. The order of priority for cutting, piling, and burning infested trees, particularly the large spots, is the same as paragraph (1) under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" every effort should be made to locate and treat all green infested trees during the piling and burning operation.

3. Chemical Control. Chemical formulation recommended for southern pine beetle control is a 1/2 percent lindane spray with No. 2 fuel oil as the carrier. This may be formulated from a 20 percent lindane emulsifiable concentrate or oil concentrate at the rate of 11 pints of concentrate in enough fuel oil to make 55 gallons of spray. (Ratio of one part 20 percent lindane EC to 39 parts No. 2 diesel fuel).

Cut, limb, and buck all infested trees into workable lengths. Spray the infested bark surface to the point of run-off. A compressed air sprayer (3-gallon capacity or equivalent) is an ideal applicator. Infested logs must be turned two or three times to insure complete treatment of infested bark. Spray stumps and bark removed by woodpeckers. Low pressure sprayers may be used to treat large, accessible infestations.

The order of priority for cutting and spraying infested trees in large spots is the same as paragraph (1) under removal of infested trees by commercial sale or administrative use. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts" every effort should be made to locate and treat all green infested trees during the chemical control operation.

Never spray trees from which southern pine beetle brood has emerged. Natural enemies of the southern pine beetle in these trees can then complete their development. To prevent aerial spotters from mapping treated spots, cut trees with red needles from which beetles have emerged.

Instructions for minimizing the adverse effects of mixing, transporting and storing pesticides, applying pesticides and disposing of pesticide containers and excess chemicals are outlined in section 8.3 of the Forest Service Health and Safety Code and FSM 5242.21. Detailed safety procedures should be outlined in the project suppression plan.

4. Reexamination of Treated Areas. Reexamine areas where infested trees were removed by commercial sales, piled and burned, or chemically treated within two or three weeks after treatment to check for additional infested trees. If additional trees are found, treat them.

## PRECAUTIONARY PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key -- out of the reach of children and animals -- away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Department of Agriculture, consult your county agricultural agent or State Extension specialist to be sure the intended use is still registered.

Table 1. Summary of results of southern pine beetle evaluations conducted on the Andrew Pickens, Edgefield, Enoree, Long Cane, and Tyger Ranger Districts, Sumter National Forest, August 1975.

		Ownership Unit				
		Andrew	Edge-			
		Pickens	field	Enoree	Long Cane	Tyger
1. Results compiled from data collected during the aerial phase of the evaluation:						
Survey type	Sketchmap	Sketchmap	Sketchmap	Sketchmap	Sketchmap	
Date of aerial survey	8/12/75	8/12/75	8/12/75	8/12/75	8/12/75	
Total acreage surveyed	128,741	222,756	194,237	208,244	205,765	
Total susceptible host type	64,370	118,090	110,089	110,396	77,000	
Total number of spots within the survey boundary	176	109	78	8	231	
Spots per M acre of host type (trees)	2.7	.9	.7	.07	3	
Average spot size (trees)	5	311	3	30	12	
Range of spot sizes (trees)	1-40	1-1000	1-15	1-90	1-100	
2. Results compiled from data collected during the ground and aerial phases of the evaluation:						
Date of ground phase	8/25/75	8/27/75	8/26/75	8/27/75	8/26/75	
Infested trees per M acre of host type	40.3	155	1.9	.5	25	
Total number of infested trees within the survey boundary	2,597	18,264	206	57	1,947	
Ratio of green infested to total red and fading trees	2.3:1	1:7.7	1:4.5	1:9	1:2.5	
Total volume of infested trees (cu. ft.)	50,901	52,966	1,854	422	16,355	

Table 2. Summary of results of southern pine beetle evaluations conducted on the Wambaw and Witherbee Ranger Districts, Francis Marion National Forest, August 1975.

		Ownership Unit	
		Wambaw	Witherbee
1. Results compiled from data collected during the aerial phase of the evaluation:			
Survey type	Sketchmap	Sketchmap	
Date of aerial survey	8/12/75	8/12/75	
Total acreage surveyed	191,933	222,786	
Total susceptible host type	95,966	111,343	
Total number of spots within the survey boundary	451	343	
Spots per M acre of host type (trees)	4.7	3.1	
Average spot size (trees)	1	2	
Range of spot sizes (trees)	1-5	1-20	
2. Results compiled from data collected during the ground and aerial phases of the evaluation:			
Date of ground phase	8/25/75	8/25/75	
Infested trees per M acre of host type	3.5	2.6	
Total number of infested trees within the survey boundary	337	285	
Ratio of green infested to total red and fading trees	1:20	1:2	
Total volume of infested trees (cu. ft.)	8,155	6,242	